

1           27. The combination of claim 21 wherein said  
2 helical tubular reaction chamber has maximum tube wall  
3 temperatures ranging from 1300°F to 1600°F, when heated  
4 by said radiant burner, in operation.

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7           28. The combination of claim 21 wherein said  
8 helical tubular reaction chamber has average heat  
9 fluxes ranging from 3,000 btu/ft<sup>2</sup>/h to  
10 10,000 btu/ft<sup>2</sup>/h, when heated by said radiant burner in  
11 operation.

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14           29. The combination of claim 21 wherein said  
15 helical tubular reaction chamber is sized to have  
16 capacity to generate hydrogen plus carbon monoxide  
17 product in volumetric quantities ranging from 50 SCFH  
18 to between 100 and 1500 SCFH.

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21           30. The combination of claim 21 wherein said  
22 radiant burner comprises a supported porous ceramic  
23 material having extended life at operating temperatures  
24 up to 2100°F.

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1           31. The combination of claim 21 wherein said  
2 radiant burner comprises a supported metal fiber  
3 material consisting essentially of an alloy containing  
4 principally iron, chromium, and aluminum and smaller  
5 quantities of yttrium, silicon, and manganese, said  
6 alloy having extended life at operating temperatures up  
7 to 2000°F.

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10           32. The combination of claim 21 wherein said  
11 radiant burner is configured to radiate heat energy in  
12 a substantially uniform radial pattern.

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15           33. The combination of claim 21 wherein said  
16 radiant burner has surface temperatures ranging between  
17 1500°F and 1900°F, in operation.

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20           34. The combination of claim 21 wherein said  
21 radiant burner has an operating combustion intensity  
22 typically ranging from 150,000 btu/ft<sup>2</sup>/h to  
23 350,000 btu/ft<sup>2</sup>/hr, wherein the combustion intensity is  
24 defined as the higher heating value of the fuel  
25 combusted divided by the permeable radiant burner  
26 surface area.

1           35. The combination of claim 21 wherein said  
2 radiant burner has an operating excess air ratio  
3 typically ranging from 30% to 100%, wherein the excess  
4 air ratio is defined as percent combustion air in  
5 excess of the stoichiometric amount required for  
6 complete combustion of the burner fuel.

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9           36. The combination of claim 22 wherein the  
10 coil has free area in the range 50% to 75%, wherein the  
11 free area is defined as the ratio of the free area  
12 between successive coil turns and the cylinder that  
13 bisects the helical coil circle.

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16           37. The combination of claim 21 wherein the  
17 convection chamber has an inlet within the combustion  
18 chamber, and an outlet outside the combustion chamber.

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21           38. The combination of claim 1 including a  
22 fuel cell in operating communication with said reaction  
23 chamber, to receive hydrogen therefrom.